REMARKS

Upon entry of this amendment, claims 5, 6, 12, 14-16, 18-20, 58 and 61-63 are pending in the application.

Claims 1-4, 7-11, 13, 17, 21-57, 59, and 64-85 are being canceled, without prejudice or disclaimer, to simplify the issues on appeal.

Claims 12 and 58 are being amended to recite a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate. This language is supported at least by the Specification at page 9, lines 25-31, which states:

> ...While a coating comprising a ceramic material having the desired low levels of metal atoms can be applied to a metal or ceramic support structure to reduce its contaminating effect on a substrate, the surface of a ceramic support component, such as ceramic electrostatic chuck having an embedded electrode can also be treated to clean the surface to reduce the contaminant levels of the surface.

The amendments also supported by Figure 1, and by the specification at page 18, lines 16-22, which states:

> In one version, a component 20 having the contamination reducing material comprises a support structure 25 comprising a substrate support 100 having an electrostatic chuck 102, and embodiment of which is shown in Figure 1. The electrostatic chuck 102 comprises an electrode 108 at least partially covered by a dielectric body 109, and may even be substantially entirely covered by the dielectric body 109. The electrode 108 is chargeable by a voltage supply to electrostatically hold a substrate 104 on the chuck 102.

Thus the claim amendments are fully supported by the Specification and add no new matter. Accordingly, entry the amendments respectfully requested.

Applicant thanks the Examiner for withdrawing the prior rejection based on the Parkhe et al. and Boyd et al. references, on the basis of the previously submitted Declaration under 37 CFR 1.132.

Section 103 Rejections

1. Claims 1, 7-10, 12-15, 17, 65-66 and 68-69 were rejected under 35 USC 103(a) as being unpatentable over US patent number 5,583,736 to Anderson et al. in view of US patent number 7,160,616 to Massler et al.

Applicant respectfully traverses this rejection. As amended, claims 12 and 58, are not obvious over Anderson et al. in view of Massler et al. An obviousness rejection requires that the prior art references, when combined, teach or suggest the invention as a whole. In making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention "as a whole." <u>Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.</u> (Fed. Cir., No. 04-1493, 6/9/05).

1. <u>The Office Action Is Not Considering the Claimed Invention As a Whole.</u>

To establish obviousness, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences <u>themselves</u> would have been obvious, but whether the claimed invention <u>as a whole</u> would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F. 2d 1530, 218 USPQ 871 (Fed. Cir. 1983).

Anderson et al. in view of Massler et al. does not teach claim 12 which recites a substrate support comprising a ceramic structure having an electrode

embedded therein, the electrode being chargeable to electrostatically hold a substrate; and having a contact surface comprising a plurality of mesas, the mesas comprising a coating of a diamond-like carbon material over a titanium layer, the diamond-like carbon material comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa, whereby the diamond-like coating reduces the abrasion and contamination of substrates that contact the coating.

First, neither Anderson et al. nor Massler et al. teach a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate, as recited in claim 12.

Instead, Anderson et al. teaches a patterned silicon plate 11 which is attached and bonded onto a metallic baseplate 13, as seen from Fig. 1 of Anderson et al. The patterned silicon plate 11 is attached over the metallic baseplate 13, and does not have an electrode embedded therein. Anderson et al. further teaches that:

> A patterned silicon plate 11, created by micromachining a silicon wafer, is electrically and mechanically attached to a metallic baseplate 13. Attachment to the base plate can also be achieved bonding materials well known in the art.

(Column 3, line 66 to column 4, line 3). Thus Anderson et al. does not teach or suggest a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate, as recited in claim 12. The embedded electrode, as claimed, is a different structure than a silicon wafer which is mechanically attached to a metallic baseplate 13 with a bonding material.

Furthermore, Anderson et al. does not teach a contact surface comprising a plurality of mesas on the dielectric, the mesas comprising a coating of a diamond-like carbon material over a titanium layer, as recited in claim 12. Instead, Anderson et al. teaches that the patterned silicon plate 11 comprises islands 19. A patterned silicon plate 11 comprising islands 19 as done by Anderson et al., is an entirely different structure from mesas comprising a coating of a diamond-like carbon material over a titanium layer, as recited in claim 12.

Further, Anderson et al. also does not teach a coating having a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa. Instead, Anderson et al. teaches islands 19 of silicon dioxide that form a patterned silicon plate 11. Thus, Anderson et al. does not teach claim 1 as a whole. Anderson et al. does not teach or suggest that is desirable to have a coating with a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa, as claimed.

Massler et al. does not make up for the deficiencies of Anderson et al. Massler et al. simply teaches "a DLC layer system" and a method of applying a layered system to an article. While Massler et al. teaches a layer system DLC coating, Massler et al. provides no indication that it is beneficial to apply such a coating to the structure of the present claim, namely a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate, as recited in claim 12.

Instead, Massler et al. teaches an entirely different set of articles for the application of this coating:

> Among the typical wear protection applications mention may here be made not only of applications in connection with machine construction, among them protection against sliding wear, pitting, cold bonding, etc., especially machine parts that move with respect to each other, such as, for example, gear wheels, pump and moulding die (cup) rams, piston rings, injection needles, complete bearings or their individual components, and various others, but also applications in the material processing sector for the protection of the tools employed for chipping or cold working and in die casting.

(Massler et al., Column 1 lines 19-29). Thus Massler et al., provides no teaching or suggestion to derive the structure comprising a substrate support comprising a ceramic structure having an electrode embedded therein, and having a contact surface comprising a plurality of mesas comprising a coating of a diamond-like carbon material over a titanium layer, as claimed in claim 12.

Furthermore, Massler et al. does not teach application of a DLC coating on a plurality of mesas for a contact surface that supports a substrate. As claimed, the contact surface of the electrostatic structure comprises a plurality of mesas comprising a coating of a diamond-like carbon material over a titanium layer, as recited in claim 12. Massler et al. simply does not teach or suggest application of a DLC layer to a substrate support structure as claimed or the benefits therefrom.

Thus, neither Anderson et al. nor Massler et al. teach or suggest claim 12 as a whole.

2. <u>The Anderson et al. and Massler et al. References When Considered as a Whole Do Not Suggest the Desirability, and thus the Obviousness, of the Suggested Combination</u>.

Furthermore, to establish a prima facie case of obviousness, there must be some suggestion of the desirability, or motivation to derive, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

However, the combination of Anderson et al., and Massler et al., does not provide motivation to derive to claimed structure of claim 12.

Anderson et al. teaches that a patterned silicon layer having islands of silicon dioxide provides good wear and abrasive properties for a substrate support. However, Anderson et al. does not motivate application of a DLC coating over a titanium layer, as claimed, to a substrate support comprising a ceramic support with an embedded electrode. It is well-known that silicon and silicon oxide have a hardness which is much lower than a DLC coating, and accordingly, by teaching that is silicon or silicon oxide surface layer provides good characteristics, Anderson et al. does not motivate application of a DLC coating, which is much harder to the surface of the structure taught therein.

Furthermore, silicon and silicon dioxide coatings as taught by Anderson et al. also have substantially different coefficients of friction than DLC coatings. Thus one of ordinary skill in the art upon learning from Anderson et al. that patterned silicon islands provides desirable wear and abrasion resistance properties, would not be motivated to substitute the silicon coating with a diamond-like coating as claimed.

Conversely, Massler et al. teaches a DLC layer system and methods of fabricating the same, but only suggest application of the coating to "machine construction, among them protection against sliding wear, pitting, cold bonding, etc., especially machine parts that move with respect to each other, such as, for example, gear wheels, pump and moulding die (cup) rams, piston rings, injection needles, complete bearings or their individual components, and various others, but also applications in the material processing sector for the protection of the tools employed for chipping or cold working and in die casting."

Clearly, Massler et al. also does not motivate derivation of a structure comprising a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate; and having a contact surface comprising a plurality of mesas, the mesas comprising a coating of a diamond-like carbon material over a titanium layer, the diamond-like carbon material comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa, whereby the diamond-like coating reduces the abrasion and contamination of substrates that contact the coating, as claimed.

Moreover, as explained in the Specification, the claimed substrate support structure and coating provide novel advantages and benefits that arise from the combination of the selected coefficient of friction and hardness values of the coating,

when such a coating is applied to a substrate support structure:

> The processing yields of substrates 104 is substantially improved with support components 20 having contact surfaces 22 capable of reducing, and even eliminating, the formation and/or deposition of contaminant residues that arise from frictional and abrasive forces between the contact surface 22 of the support component 20 and the substrate 104. For example, when the component 20 is made from a metal containing material, metal contaminant particles deposit on the substrate 104 when the substrate 104 rubs against the contact surface 22 of the support component 20. It has been found that the frictional residues have larger particle sizes or numbers, when the contact surface 22 is excessively soft, has a high frictional coefficient causing abrasion of the surfaces, or has a high level of impurities. To reduce such contamination, the contact surfaces 22 of the support component 20 are provided with a surface coating 24 that has desirable abrasion or hardness, frictional properties, and/or low-levels of contaminants. The contamination reducing coating 24 may cover at least a portion of a surface 26 of an underlying component structure 25, as shown for example in Figure 2a, or may even cover substantially the entire surface that is in contact with the substrate 104. ...
>
> In one version, the contamination reducing coating comprises a material having a coefficient of friction that is sufficiently low to reduce the formation and deposition of friction or abrasion resulting particulates on the substrate 104. The low-friction material can improve substrate processing yields by contacting the substrate 104 only with a low-friction material that is less likely to flake or "rub-off" the surface 22 and deposit onto the substrate 104. The low-friction material suitable for the surface 22 desirably comprises a coefficient of friction of less than about 0.3, such as from about 0.05 to about 0.2. The coefficient of friction is the ratio of the limiting frictional force to the normal contact force when moving the surface 22 relative to another surface. ...
>
> The contamination reducing coating also desirably has a high hardness to provide better resistance to scratching and abrasion by the substrate 104. When the substrate is a relatively hard material, it is desirable for the contact surface 22 to also be composed of a material having a relatively high hardness to be less likely to generate loose particles or flakes due to scratching of the surface 22. A suitable contamination reducing coating may comprise a hardness of at least about 8 GPa, such as from about 8 Gpa to about 25 Gpa, and even at least about 10 GPa, such as from about 18 Gpa to about 25 GPa.

> The surface 22 desirably comprises a hardness that is selected with respect to the substrate 104 being processed. For example, the surface 22 of a component for processing a substrate 104 comprising a semiconductor wafer may have a hardness that is different than the hardness of a surface 22 for processing a substrate 104 comprising a dielectric glass panel used for displays.

(Specification, page 7, line 24 to page 8, line 36).

These teachings to the advantages or benefits of the claimed substrate support having a diamond like carbon coating with particular properties, are not taught or suggested by Anderson et al. and Massler et al.

3. <u>The Office Action Has Not Demonstrated That There is a Reasonable Expectation of Success for the Proposed Combination</u>.

It should be further noted that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicant's disclosure. *In re Vaeck*, Ibid. It would appear that the Office Action is relying on Applicant's disclosure to find an expectation of success from the cited references. The mere fact that Anderson et al. and Massler et al. references <u>can</u> be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

It is certainly not obvious that the substitution of the soft silicon layer, or silicon dioxide islands, as taught by Anderson et al. with a DLC coating as claimed would result in an electrostatic structure that actually worked as intended.

Application of a DLC layer system to machine parts and other articles as taught by Massler et al., also does not generate a reasonable expectation of success that a DLC coating on an electrostatic chuck would provide the desired characteristics. For example, the surface coating of an electrostatic chuck has to have a sufficient resistance to prevent leakage of the charge applied to the electrode of the chuck to the

surface of the electrostatic chuck. Such leakage of current would cause loss of electrostatic force, and would ruin the substrate during processing. There is simply no indication from the teachings of Massler et al., or the teachings of Anderson et al. that the application of a DLC coating to an electrostatic chuck structure would operate as intended.

Furthermore, the results of the claimed invention cannot be derived in hindsight using an "obvious to try" rationale based on any possible combination of a reference that teaches a particular coating with a references that teaches a particular support structure. Thus application of a high hardness diamond-like coating to a substrate support structure to obtain a substrate support which does not excessively abrade a substrate has not been proven by the cited combination of references. As explained in the Specification, the claimed support structure with a diamond like coating have selected coefficient of friction and hardness properties which provide benefits that are surprising in light of Anderson et al.'s teachings to silicon dioxide islands and negate a finding of obviousness based on the cited references. Thus the Office Action has not demonstrated that the combination of Anderson et al. and Massler et al. would be determined by one of ordinary skill to provide a coated substrate support having the desired low abrasion of substrates, while still providing good wear resistance.

For these reasons, claim 12 and its dependent claims are not obvious over Anderson et al. in view of Massler et al.

2. Claims 4-6, 16 and 18, 20, 58-64 and 67 were rejected under 35 USC 103(a) as being unpatentable over US patent no. 5,583,736 to Anderson et al., in view of US patent no. 7,160,616 to Massler et al., as applied to claims 1-3, 7-10, 12-15, 17, 65-66 and 68-69 above, and further in view of US patent no. 5,352, 493 to Dorfman et al..

Claims 4-6 are dependent upon claim 1 which has now been cancelled.

Claims 16, 18 and 20 dependent upon claim 12, and these claims are not obvious over Anderson et al., in view of Massler et al., and further in view of Dorfman et al. for the same reasons as recited above for claim 12.

Dorfman et al. does not make up for the deficiencies of Anderson et al. and Massler et al., because Dorfman et al. teaches a method of inhibiting corrosion of the substrate by applying a diamond-like solid-state material on the substrate. (Abstract). From the examples provided by Dorfman et al. in columns 11-14, it appears that Dorfman et al. teaches providing diamond like coatings on metal substrates to prevent their corrosion.

However, Dorfman et al. does not teach a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate. Nor does Dorfman et al. teach a contact surface on such a structure, and which further comprises a plurality of mesas comprising a coating of a diamond-like carbon material over a titanium layer. Dorfman et al. also does not teach a coating having a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa as claimed in claim 12. Further, Dorfman et al. does not make up for the deficiencies of Massler et al. and Anderson et al., because Dorfman et al. does not provide any motivation to apply a DLC coating to the claimed substrate support structure.

For these reasons, claim 12 and its dependent claims 16, 18 and 20 are not obvious over Anderson et al. in view of Massler et al. and Dorfman et al.

Claims 59-64 and 67 depend upon independent claim 58 which is to a substrate support comprising a ceramic support structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate; and a contact surface comprising a plurality of mesas, the mesas comprising a coating comprising a diamond-like carbon material having a carbon-hydrogen network, the coating having a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa, whereby the contact surface of the coating is capable of reducing abrasion and contamination of a substrate that contacts the contact surface; and (c) a metal-containing adhesion layer between the dielectric and the coating of the mesas.

Anderson et al., Massler et al. and Dorfman et al. do not teach or suggest claim 58. Anderson et al. teaches an electrostatic chuck faced with a pattern silicon plate 11, created by micro-machining a silicon wafer, which is attached or bonded to a metallic baseplate 13. However, Anderson et al. does not teach a substrate support comprising a ceramic support structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate.

Nor does Anderson et al. teach or suggest a substrate support comprising a contact surface comprising a plurality of mesas, the mesas comprising a coating comprising a diamond-like carbon material having a carbon-hydrogen network. Instead, Anderson et al. only teaches a silicon wafer having silicon dioxide islands, which is bonded to metallic baseplate. Anderson et al. also does not teach the advantages obtained from a coating comprising a diamond-like carbon material having a carbon-hydrogen network, on a substrate support structure. Nor does Anderson et al. teach a coating having a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa.

Massler et al. does not make up for the deficiencies of Anderson et al., because Massler et al. teaches a DLC coating on machine parts that are subject to wear, such as gears and the like, and not a substrate support comprising a ceramic

support structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate. It is not obvious to substitute machine and gear parts with an electrostatic substrate support comprising a ceramic support structure with an embedded electrode, and still have a reasonable expectation of success of the electrostatic forces applied by the support would still operate.

Dorfman et al. teaches a method of inhibiting corrosion of the substrate by applying a diamond-like solid-state material on metal substrates to prevent their corrosion. Dorfman et al. does not teach or suggest a substrate support comprising a ceramic support structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate, as claimed in claim 58. Nor does Dorfman et al. teach a contact surface on such a structure, and which further comprises a plurality of mesas comprising a coating of a diamond-like carbon material. Dorfman et al. also does not teach a coating having a contact surface comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa as claimed in claim 58. Further, Dorfman et al. does not make up for the deficiencies of Massler et al.

For these reasons, claim 58 and its dependent claims are not obvious over Anderson et al. in view of Massler et al. and Dorfman et al.

3. Claim 19 was rejected under 35 USC 103(a) as being unpatentable over US patent no. 5,583,736 to Anderson et al., in view of US patent no. 7,160,616 to Massler et al., as applied to claims 1-3, 7-10, 12-15, 17, 65-66 and 68-69 above, and further in view of US patent no. 5,352, 493 to Dorfman et al.

Claim 19 is dependent upon claim 12, and is not obvious over Anderson et al. in view of Massler et al. and Dorfman et al. for the same reasons as presented above for claim 12. To avoid repetition, these reasons will not be repeated herein, and the Examiner is referred to the arguments provided above.

4. Claim 70-77 and 82-85 are rejected under 35 USC 103(a) as being unpatentable over US patent no. 5,583,736 to Anderson et al., in view of US patent no. 7,160,616 to Massler et al., and US patent no. 5,352, 493 to Dorfman et al.

Claims 70 -77 and 82-85 are now cancelled.

5. Claims 78-81 was rejected under 35 USC 103(a) as being unpatentable over US patent no. 5,583,736 to Anderson et al., in view of US patent no. 7,160,616 to Massler et al., and US patent no. 5,352, 493 to Dorfman et al.

Claim 78-81 are now cancelled.

Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,
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Date: July 11, 2008

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